

CLAIMS

What is claimed is:

- 1 1. A method comprising:
 - 2 providing a first wafer having a stack structure of a first base substrate, a
 - 3 layer of relaxed film, and a first layer of strained film,
 - 4 depositing a layer of oxide onto the layer of strained film to provide an
 - 5 adhesion surface to the first wafer;
 - 6 providing a second wafer, the second wafer being a silicon on insulation
 - 7 (SOI) wafer having a stack structure of a second base substrate and a layer of oxidized
 - 8 film;
 - 9 attaching the first and second wafers; and
 - 10 heating the first and second wafers at a first temperature to cause a
 - 11 silicon dioxide (SiO_2) adhesion of the first substrate to the second substrate.
- 1 2. The method of claim 1 further comprising:
 - 2 implanting hydrogen onto the first wafer before depositing the layer of
 - 3 oxide onto the second layer of strained film to create an embrittled region in the layer
 - 4 of relaxed film.
- 1 3. The method of claim 2 further comprising:
 - 2 heating the first and second wafers at a second temperature to
 - 3 delaminate the two wafers along the embrittled region to form the second wafer having
 - 4 the layer of relaxed film.
- 1 4. The method of claim 3 further comprising:

2 etching the relaxed film on the surface of the second wafer to expose the
3 strained film.

1 5. The method of claim 1 wherein the first and second base substrates are
2 made of silicon material.

1 6. The method of claim 1 wherein the layer of relaxed film is a relaxed
2 Silicon Germanium (SiGe) layer having a thickness in a range of approximately 0.1 to
3 3.0um.

4 7. The method of claim 1 wherein the layer of oxide is deposited at a
5 thickness range of approximately 50 to 3000A.

1 8. The method of claim 2 wherein the hydrogen is implanted at an energy
2 range of approximately 1 to 20keV.

1 9. The method of claim 3 wherein the second temperature is higher than
2 the first temperature.

1 10. The method of claim 3 wherein the first temperature is in a range of
2 approximately 100 °C to 300 °C.

1 11. The method of claim 3 wherein the second temperature is in a range of
2 400 °C to 600 °C.

1 12. The method of claim 1 further comprising:

2 etching the first base substrate, and the layer of relaxed film to result in
3 the strain of film on the surface of the SOI wafer.

1 13. The method of claim 12 wherein the etching of the first layer of strained
2 film comprises wet etching the layer of relaxed film.

1 14. A wafer comprising:
2 a silicon layer;

3 a relaxed SiGe layer; and
4 a strained silicon layer in contact with the relaxed SiGe layer, the strained
5 silicon layer being transferred to the top of the relaxed SiGe layer by a heat treatment.

1 15. The wafer of claim 14 wherein the relaxed SiGe layer contains an
2 embrittled region.

1 16. The wafer of claim 15 wherein the embrittled report is created by
2 implanting hydrogen ions.

1 17. A wafer comprising:
2 a silicon layer;
3 a SiO₂ layer in contact with the silicon layer; and
4 a strained silicon layer on top of the SiO₂ layer, the strained silicon layer being
5 transferred to an oxidized wafer by a heat treatment.

1 18. The wafer of claim 17 wherein the oxidized wafer contains a relaxed
2 SiGe layer.

1 19. The wafer of claim 18 wherein the relaxed SiGe layer contains an
2 embrittled region.